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(54) **DEVICE FOR RETAINING DOCTOR BLADES**

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(52) **U.S. Cl.**
USPC **162/280**

(58) **Field of Classification Search**
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See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

3,854,162	A	12/1974	Russel	
6,087,950	A *	7/2000	Capan	340/665
6,328,853	B1 *	12/2001	Goodnow et al.	162/281
6,687,950	B1 *	2/2004	Rata et al.	15/256.51
2006/0054293	A1	3/2006	Strauch	
2007/0163738	A1	7/2007	Kurkinen	
2009/0148208	A1	6/2009	Gauvin et al.	

FOREIGN PATENT DOCUMENTS

DE	195 08 298	A1	9/1996
EP	1567715	B1	5/2006
WO	WO 2006/010794	A1	2/2006
WO	WO 2009/076128	A1	6/2009

OTHER PUBLICATIONS

International Search Report issued by the European Patent Office in International Application PCT/EP2012/065874 on Sep. 20, 2012.

* cited by examiner

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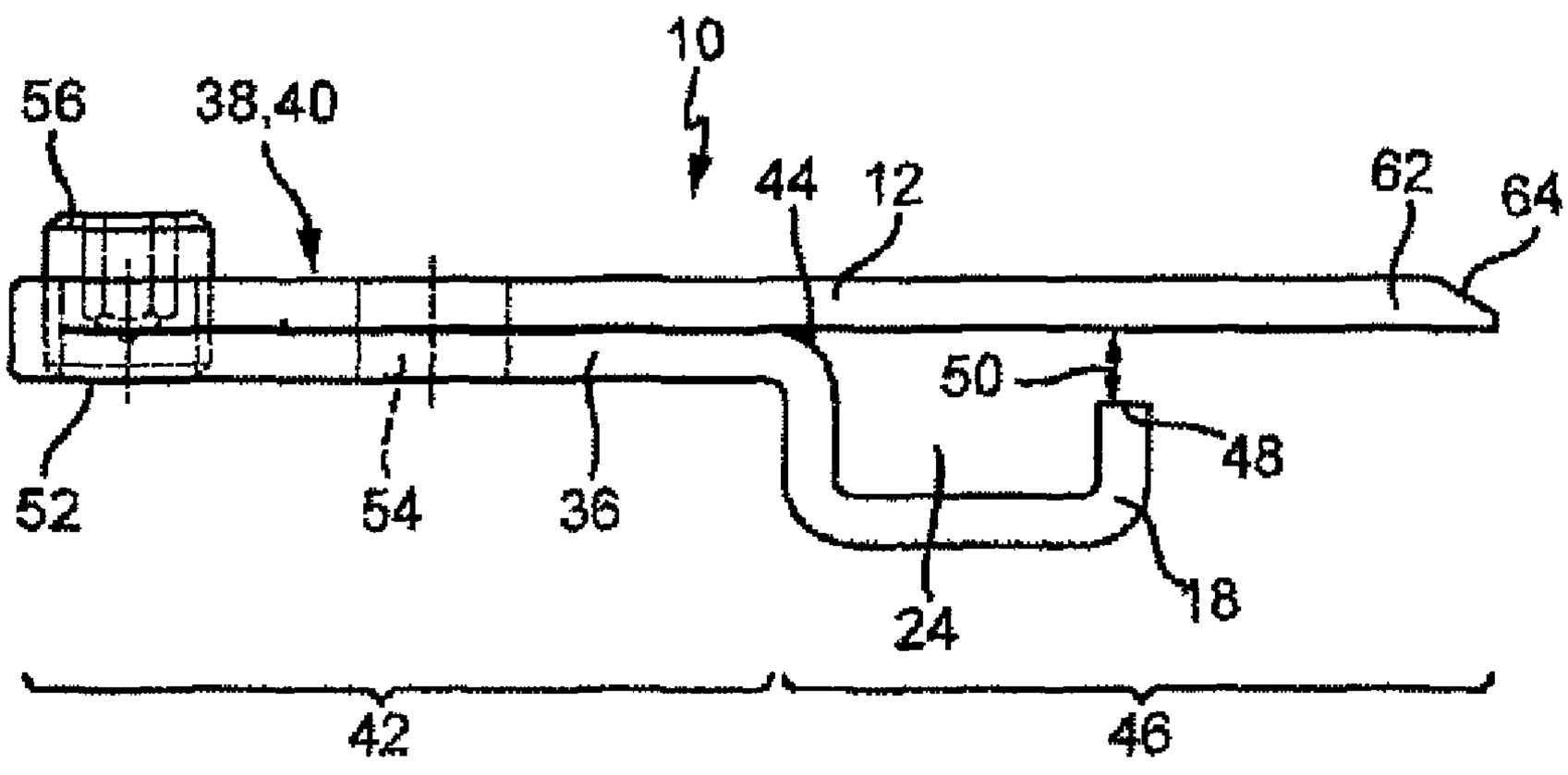
(57) **ABSTRACT**

A device for retaining doctor blades includes a support element and a retaining finger with a doctor blade pocket inserted between the support element and the retaining finger. The support element and the retaining finger are constructed as a single piece.

9 Claims, 2 Drawing Sheets



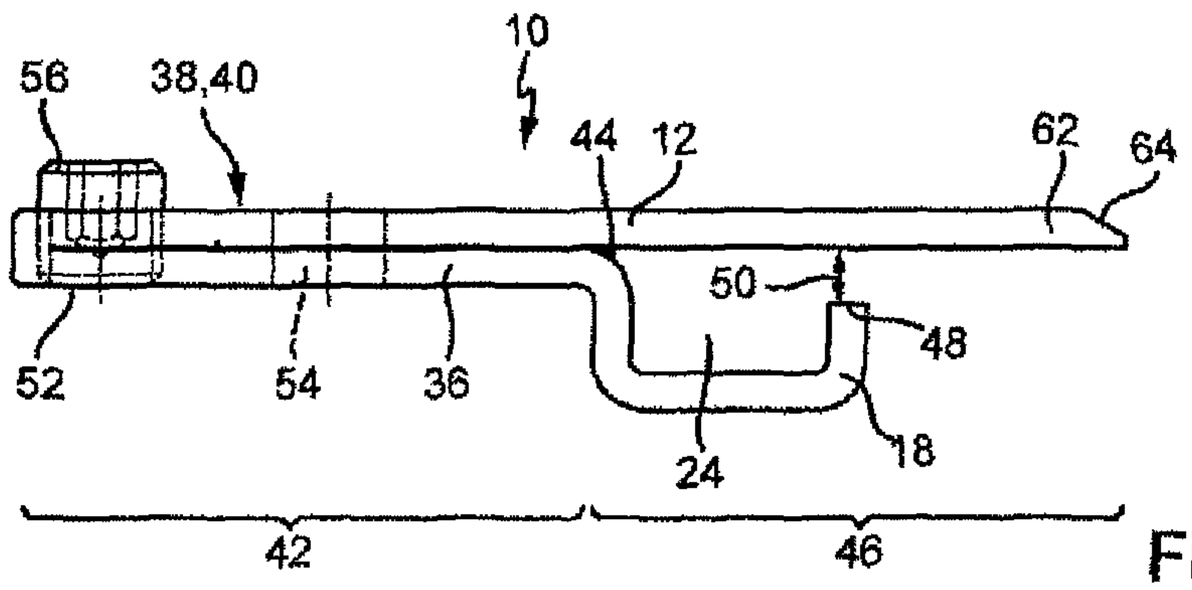


Fig. 1

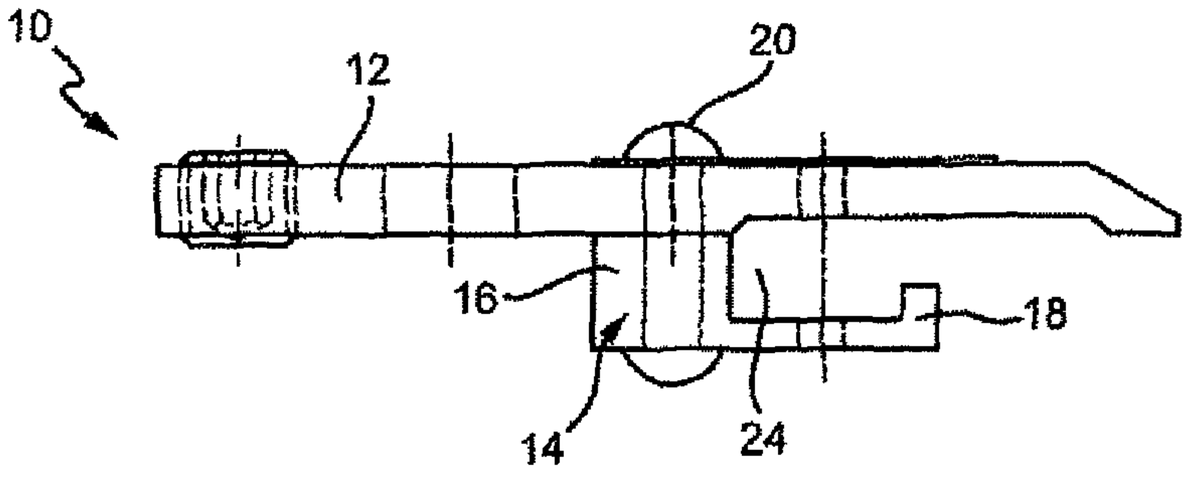


Fig. 2
(Prior Art)

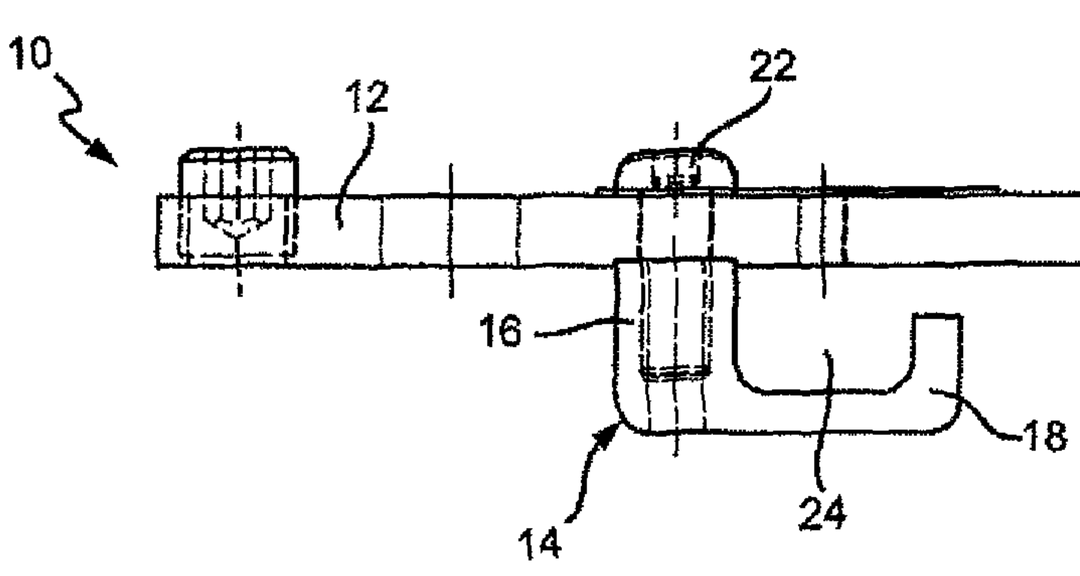


Fig. 3
(Prior Art)

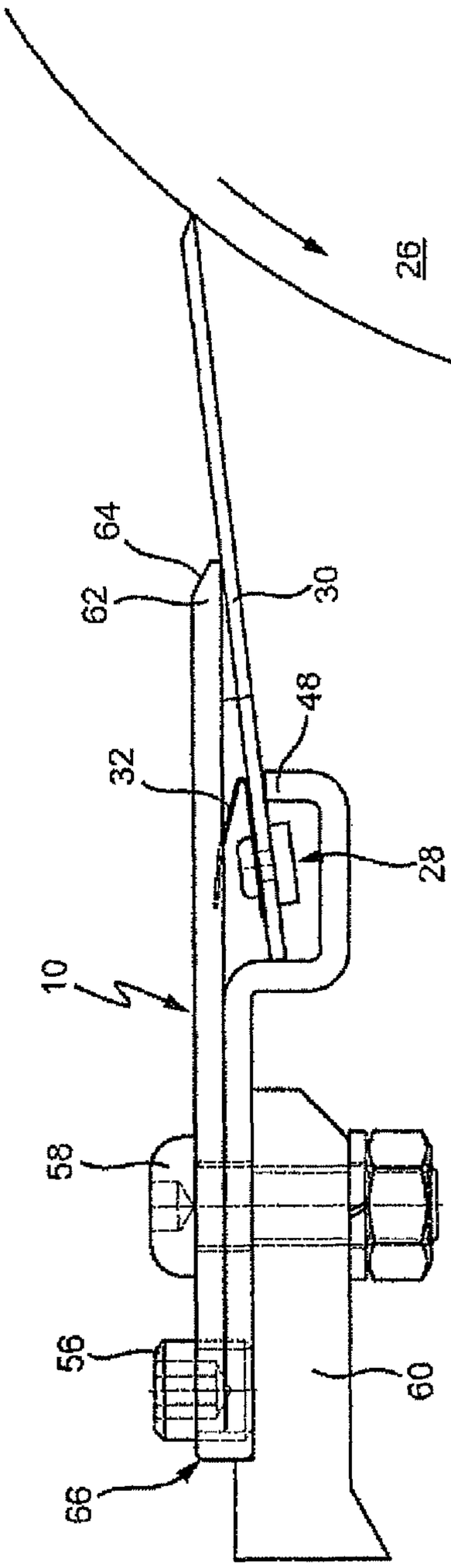


Fig. 4

DEVICE FOR RETAINING DOCTOR BLADES

CROSS-REFERENCES TO RELATED APPLICATIONS

This application is the U.S. National Stage of International Application No. PCT/EP2012/065874, filed Aug. 14, 2012, which designated the United States and has been published as International Publication No. WO 2013/029988 and which claims the priority of German Patent Application, Serial No. 10 2011 081 926.6, filed Aug. 31, 2011, pursuant to 35 U.S.C. 119(a)-(d).

BACKGROUND OF THE INVENTION

The invention relates to a device for retaining doctor blades with a support element and a retaining finger having the doctor blade pocket, wherein the doctor blade is inserted between the support element and the retaining finger.

A scraping device or scraper blade, also referred to as a doctor blade, has the task, among others, to clean the surface of a roller or a cylinder. In the case of a paper machine, such a doctor blade has the effect that the paper web guided across the respective roller of the paper machine is not wound up on the roller in the event of a web break, but exits the roller at the predetermined position to reach, for example, a collection tray. This doctor blade must ensure that this task is performed with 100% certainty, since otherwise considerable failures would occur in the papermaking process, possibly even damage the paper machine. The doctor blade also has the task to clean the surface of the roller so that the paper web is not marked. For this reason, the doctor blade attached to its holder must be in contact with the roller as uniformly as possible over its entire length. For pressing the doctor blade onto the roller surface, the holder is generally constructed in two parts and has a bottom plate which is typically attached on the machine frame. A top plate is pivotally attached on this bottom plate, so that the doctor blade can be lifted off the roller surface, or placed on and pressed against the roller surface (EP 1 567 715 B1, DE 195 08 298 C2 and WO 2009/076 128 A1).

The production of this retaining device is, however, very time-consuming and therefore costly. In addition, a large number of components must be managed, such as cover plates, bottom plates, screws, etc. The assembly is time-consuming, because the many components screwed together and adjusted.

SUMMARY OF THE INVENTION

Based on the DE 195 08 298 C2, it is therefore the object of the invention to provide a device for retaining doctor blades which can be more easily manufactured and assembled.

This object is attained with a device of the aforementioned type according to the invention by integrally forming the support element and the retaining fingers.

The one-piece embodiment of the retaining device has the essential advantage that the number of components is drastically reduced, which also simplifies assembly. The storage is substantially easier.

According to the invention, the support element and the retaining fingers are formed by a bent sheet metal part. Here, one sheet metal section forms the support element and the other sheet metal section forms the retaining finger abutting the support element. The support element and the retaining finger are produced by bending the sheet metal strip by 180°.

Advantageously, the retaining finger and the support element are welded together, in particular laser-welded, in the region before the retaining finger lifts off from the support element. The welding beam advantageously passes through the gap between the free end of the retaining finger and the support element.

A retaining device produced in this way according to the invention can be easily cut to the desired length, for example by sawing.

The retaining finger has a free end that is spaced from the support element. The scraper pocket, into which the scraper blade is inserted and in which it retained, is located behind this gap. The scraper pocket is formed on three sides by the retaining finger and on one side by the support element.

The distance between the free end and the support element has here a defined width. The width of the distance is advantageously adjusted by a saw cut extending parallel to the plane of the support element and is, for example 4.5 mm.

According to a further development of the invention, the support element of the retaining finger may have apertures for receiving adjusting screws and/or fastening screws. These are advantageously punched after the bending operation.

Preferably, the end opposite of the doctor blade, where the support element transitions into the retaining finger, is finish-machined and a pinch edge is removed.

In an advantageous exemplary embodiment of the invention, the free end of the support element has on its top side facing away from the retaining finger a chamfer which is formed by pressing down. This chamfer is used to ensure that dirt is diverted so as not to accumulate upstream of the retaining device.

Further advantages, features and details of the invention are evident from the dependent claims and from the following description in which a preferred embodiment is described. The features shown in the drawing and mentioned in the description and in the claims may be essential for the invention severally or in any combination.

BRIEF DESCRIPTION OF THE DRAWING

In the drawings:

FIG. **1** shows a cross section through the retaining device according to the invention;

FIG. **2** shows a first retaining device of the prior art according to DE 195 08 298 C2;

FIG. **3** shows a second retaining device according to the prior art, and

FIG. **4** shows the retaining device according to FIG. **1** after installation and with an inserted doctor blade.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

FIGS. **2** and **3** each show a respective retaining device **10**, as is known from the prior art. The retaining device **10** includes an upper support element **12** and a lower component **14** having a U-shaped cross-section. One U-leg **16** of the component **14** is not only longer, but also substantially thicker than the other U-leg **18**. The one U-leg **16** of the component **14** is permanently connected to the strip-shaped support element **12** with rivets **20** or equivalent elements, such as screws **22**. Both create in conjunction a scraper pocket **24** which in the drawing is open to the right and accommodates the free end **28** of a scraper blade **30** facing away from a roller **26** (see FIG. **4**). The free end **28** may advantageous be provided with spring elements **32**, formed for example as leaf springs or shackle springs, which are preferably supported on the bot-

tom side of the strip-shaped support element **12** and thereby retain the scraper blade **30** without allowing movement. As can be clearly seen, the retaining device **10** is composed of a plurality of discrete elements, namely a support element **12**, a component **14** and several rivets **20** or screws **22**.

FIG. **1** shows an exemplary embodiment of a retaining device **10** according to the invention with a support element **12** and a retaining finger **36** which are both formed from a single sheet-metal strip **38**. The sheet-metal strip **38** is a bent sheet-metal part **40** having a uniform thickness and made for example of stainless steel. In a first section **42**, the support element **12** and the retaining fingers **36** abut each other and are welded together at the transition **44** to a second section **46**, e.g. by using a laser. The free end **48** of the leg **18** has in relation to the support element **12** a distance **50** with a precise dimension. This dimension is adjusted by a saw cut parallel to the support element **12** and between the support element **12** and the free end **48**. As is also apparent, apertures **52** and **54** (e.g. in the form of drilled holes) are provided in section **42**, in which adjusting screws **56** and fastening screws **58** are inserted. The fastening screws **58** are used to attach the retaining device **10** to a machine frame **60**, while the retaining device **10** can be slightly tilted with the adjusting screws **56**, whereby the doctor blade **30** can be matched, for example, to a camber of a roller **26**.

Lastly, it is apparent that the free end **62** of the support element **12** is provided with a chamfer **64** formed by pressing. This ensures that the dirt scraped off by the doctor blade **30** is diverted. The squeezed edge **66** was finish-machined, for example by grinding, so that the retaining device **10** rests fully and flat on the machine frame **60**.

The invention claimed is:

1. A device for retaining a doctor blade, the device comprising:

a support element, and

a retaining finger having a doctor blade pocket, wherein the support element and the retaining finger are formed as a single piece and the doctor blade is inserted between the support element and the retaining finger,

wherein the support element and the retaining finger are formed of a single bent sheet-metal part having a uniform sheet-metal thickness and the retaining finger comprises a first section abutting the support element and a second section constructed to lift off or move away from the support element, wherein the retaining finger is welded to the support element in a transition region disposed between the first section and the second section.

2. The device of claim **1**, wherein the retaining finger is welded to the support element in the transition region by a laser weld.

3. The device of claim **1**, wherein the second section of the retaining finger comprises a free end having a spacing to the support element.

4. The device of claim **3**, wherein the spacing has a defined width.

5. The device of claim **4**, wherein the width of the spacing is adjusted by a saw cut extending parallel to a plane of the support element.

6. The device of claim **1**, wherein the support element and the retaining finger comprise apertures constructed to receive adjusting screws or fastening screws, or both.

7. The device of claim **1**, wherein an end of the device distal from the doctor blade, where the support element transitions into the retaining finger, is finish-machined and burr-free.

8. The device of claim **1**, wherein the support element comprises a free end having a chamfer disposed on a top side of the support element facing away from the retaining finger.

9. The device of claim **8**, wherein the chamfer is produced by pressing.

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